

REMARKS

Favorable reconsideration is respectfully requested.

The claims are 1-14.

The above amendment makes a minor correction to claim 1 and cancels claims 15-18.

Claims 1-3, 5-7, 9, 15 and 16 are rejected under 35 U.S.C. § 102(a) as being anticipated by Yamamoto et al. (U.S. 5,527,731).

Further, claims 4, 10, 17 and 18 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamamoto et al.

Claims 11-14 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamamoto et al. in view of Ito et al. (U.S. 5,561,326).

These rejections are respectfully traversed.

A brief discussion of the present invention will be of assistance in appreciating Applicants' reasons for traversal of the rejection.

Claim 1 recites the steps of:

- 1) mixing a substance liquid at room temperature under atmospheric pressure and a pressurized gas, and
- 2) causing the resultant mixture to spout as a gas from a nozzle to generate a cluster which is a lumpy group of atoms or molecules.

On the other hand, the Yamamoto et al. does not disclose or suggest the feature of steps 1) and 2).

To generate clusters in the liquid state at ordinary temperatures and pressures using the system of Fig. 2 in Yamamoto et al., it is at least necessary to mix liquid materials with He or other gaseous materials in cylinder 25. Such mixing is not generally employed. In other words, there is no explanation of how to generate clusters in the liquid state in the cited references.

Similar arguments are applicable with regard to claims 2-10.

Claims 11 through 14 of the present invention recite that two or more chemically reactive species, including at least one type of gas cluster ion, are irradiated to deposit thin film.

On the other hand, Yamamoto et al. does not disclose that thin film is deposited by irradiating two or more chemical reactive species simultaneously.

The secondary reference clearly fails to overcome the deficiencies of Yamamoto et al.


For the foregoing reasons, it is apparent that the rejections on prior art are untenable and should be withdrawn.

No further issues remaining, allowance of this application is respectfully requested.

If the Examiner has any comments or proposals for expediting prosecution, please contact the undersigned at the telephone number below.

Respectfully submitted,

Makoto AKIZUKI et al.

By: 
Matthew Jacob
Registration No. 25,154
Attorney for Applicants

MJ/kjf
Washington, D.C. 20006-1021
Telephone (202) 721-8200
Facsimile (202) 721-8250
February 7, 2003

1.(Amended) A method for forming a gas cluster which comprises the steps of mixing a substance liquid at [the] room temperature under [the] atmospheric pressure and a pressurized gas, and causing the resultant mixture to spout as a gas from a nozzle to generate a cluster which is lumpy group of atoms or molecules.

11.(Amended) A method for forming a thin film, which comprises the steps of forming a cluster which is a lumpy group of atoms or molecules of a reactive substance gaseous at [the] room temperature, irradiating cluster ions ionized therefrom onto a substrate surface, and at the same time or alternatively, irradiating a [single, or a] plurality of component gases of a deposit film onto the substrate surface to cause reaction [of the both] thereof, thereby depositing a thin film on the substrate surface;

wherein two or more gases to be irradiated simultaneously are fed after converting same into clusters.

12.(Amended) A method for forming a thin film, which comprises the steps of forming a cluster which is an annular group of atoms or molecules of a reactive substance gaseous at [the] room temperature, irradiating cluster ions ionized therefrom onto a substrate surface, and at the same time or alternatively, irradiating [a single, or] a plurality of component [gas] gases of a deposit film onto the substrate surface to cause reaction [of the both] thereof, thereby depositing a thin film on the substrate surface; wherein at least one of the gaseous reactive substances to be converted into cluster is an oxygen-containing substance.

14.(Twice Amended) A method for forming a thin film as claimed in claim 11, which comprises the steps of irradiating oxygen gas cluster ions onto the substrate, and at the same time, or alternately, irradiating [a single, or a] plurality of, component gas of a deposit film onto the substrate surface to cause reaction of [the] both, thereby depositing a thin ferroelectric film on the substrate surface.